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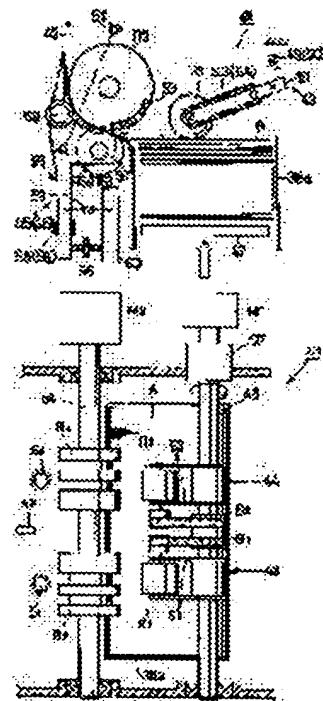
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## (54) PAPER SHEET DELIVERY DEVICE AND EXCHANGE DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To allow a paper sheet delivery device to have high delivery performance by using pressure detection means to detect changes in force applied to a delivery means when the delivery means delivers paper sheets, and allowing delivery failure detection means to detect paper sheet faults in accordance with this pressing force.

**SOLUTION:** When a delivery signal for bills A is input, whether or not feed rollers R3, R4 are set in initial positions appropriate for delivering the bills one by one is determined, and then a timer is set to rotate pickup rollers R1, R2 by an amount of rotation appropriate for delivering the bills A one by one and then to stop the rollers R1, R2. Before delivery of the bills A, pressure detection using strain sensors S3, S4 for the right and left pick rollers, detection of the torque of the pickup rollers R1, R2 using a torque sensor S7, and detection of pressures on gate rollers R5, R6 using strain sensors S5, S6 for the gate sensors are started. When the sensors S3 to S7 detect that the bill A itself has some fault, the pickup rollers R1, R2 and the feed rollers R3, R4 are rotated reversely to stop delivery immediately before delivery from the feed rollers R3, R4.



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## CLAIMS

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### [Claim(s)]

[Claim 1] Paper leaf delivery equipment had a welding-pressure detection means to be paper leaf delivery equipment equipped with the delivery means which carries out delivery actuation of the paper leaf, and to detect change of the force of joining the above-mentioned delivery means, and an abnormality detection means in a delivery to detect the abnormalities in a delivery of paper leaf based on the welding pressure which the above-mentioned welding-pressure detection means detected.

[Claim 2] The abnormality detection means in a delivery is paper leaf delivery equipment [ equipped with a fragmentation distinction means to subdivide and distinguish the abnormalities in a delivery of the detected paper leaf ] according to claim 1.

[Claim 3] Paper leaf delivery equipment [equipped with the control means which carries out restoration actuation of the abnormalities in a delivery of paper leaf according to the contents of distinction which the fragmentation distinction means distinguished] according to claim 2.

[Claim 4] The dealings processor which is equipped with paper leaf delivery equipment according to claim 1, 2, or 3, and carries out dealings processing.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the paper leaf delivery equipment and the dealings processor which are rich in the delivery management engine performance of paper leaf in more detail about the delivery equipment of paper leaf by which an internal configuration is carried out to the automatic dealings machine which deals with paper leaf, such as a bill.

#### [0002]

[Description of the Prior Art] Generally, this kind of paper leaf delivery equipment is carrying out delivery actuation of the paper leaf, carrying out the detection check of every one delivery condition of the paper leaf by which delivery starting was carried out. this time -- a skew -- shortly after taking out and accepting abnormalities in delivery, such as bias to a nonprocess runout, poor conveyance spacing, poor size, and the cross direction, it processes [ rejection-] or processes [ return-] By this, the bad influence to the latter part was avoided, accumulation actuation of paper leaf, symmetry actuation, conveyance actuation, and front flesh-side reversal actuation were made smooth, and generating of the jam (paper jam) accompanying abnormality paper leaf generating is prevented (for example, refer to Japanese Patent Application No. No. 313714 [ two to ] of precedence application).

[0003] However, such a detection means has been arranged in the latter part of delivery equipment, and carried out the detection check of the delivery back of paper leaf, the abnormality paper leaf moreover sent out was conveyed for a long time to the return processing location as it was, and a jam incidence rate, such as receiving symmetry processing and accumulation processing in this conveyance process, was high. Moreover, in the paper leaf of the 2nd sheet continuously sent out to a degree, in response to the bad influence, the jam incidence rate was high similarly.

[0004] Furthermore, although it was made to perform fixed time amount delivery actuation at the time of nonprocess-runout generating of paper leaf, since fixed time amount delivery actuation was carried out while the cause of abnormalities had been unknown, induction of the jam might be carried out on the contrary, and damage on paper leaf and the life of equipment might be shortened.

[0005]

[Problem(s) to be Solved by the Invention] Then, this invention aims at offer of the paper leaf delivery equipment which has the high delivery engine performance it was made to resume conveyance since a delivery halt is carried out immediately and restoration actuation was carried out when the abnormality element in a delivery is detected at the time of the delivery of paper leaf, and a dealings processor.

[0006]

[Means for Solving the Problem] Invention according to claim 1 is paper leaf delivery equipment equipped with the delivery means which carries out delivery actuation of the paper leaf, and it carries out having had a welding-pressure detection means to detect change of the force of joining the above-mentioned delivery means, and an abnormality detection means in a delivery to detect the abnormalities in a delivery of paper leaf based on the welding pressure which this welding-pressure detection means detected as the description.

[0007] Invention according to claim 2 is characterized by equipping the abnormality detection means in a delivery with a fragmentation distinction means to subdivide and distinguish the abnormalities in a delivery of the detected paper leaf.

[0008] Invention according to claim 3 is characterized by having the control means which carries out restoration actuation of the abnormalities in a delivery of paper leaf according to the contents of distinction which the fragmentation distinction means distinguished.

[0009] Invention according to claim 4 is characterized by being the dealings processor which is equipped with paper leaf delivery equipment and carries out dealings processing.

[0010]

[Function] According to this invention, a welding-pressure detection means detects change of the force in which a delivery means joins this delivery means in paper leaf at the time of \*\*\*\*\*, and the abnormality detection means in a delivery detects the abnormalities in a delivery of paper leaf based on that welding pressure.

[0011] Moreover, when the abnormality detection means in a delivery detects the abnormalities in a delivery of paper leaf, a fragmentation distinction means subdivides and distinguishes the abnormalities in a delivery of this detected paper leaf.

[0012] Furthermore, according to the contents of distinction which the fragmentation distinction means distinguished, a control means carries out restoration actuation of the abnormalities in a delivery of paper leaf.

[0013] Dealings processing of the paper leaf is carried out with the dealings processor equipped with such paper leaf delivery equipment.

[0014]

[Effect of the Invention] Consequently, it is at the delivery initiation time of paper leaf, and since the abnormalities in a delivery of paper leaf are detectable, it is at this delivery initiation time, and restoration actuation is performed, it is at the delivery initiation time and the abnormality element in a delivery can be canceled. Therefore, the conveyance supply of all the paper leaf can be carried out in the proper condition on a latter conveyance way, a jam generating element can be canceled, the down of a paper leaf processor can be avoided, and the reliable stable delivery is obtained.

[0015] Moreover, the cause of generating of the abnormalities in a delivery can be subdivided and specified for the detection configuration which detects the abnormality element in a delivery to paper leaf from the change condition of the force applied to a delivery means at the time of a paper leaf delivery, and based on specification of this cause of an abnormal occurrence, the optimal restoration actuation according to delivery conditions at present can be chosen, and it can restore. Since such exact detection information is acquired for every delivery, delivery \*\*\*\*\* is made, adjusting to the class of paper leaf, and the optimal delivery conditions for every paper leaf which changes with circulation degrees, and making self-correction during employment. Furthermore, when the internal configuration of the paper leaf delivery equipment is carried out to a dealings processor, the delivery engine performance is stabilized and dealings processing of reliable paper leaf can be performed.

[0016]

[Example] One example of this invention is explained in full detail based on a drawing below. Drawing 1 shows ATM (ATM) 11 installed in financial institutions, such as a bank, and in the front face of the upper part of the body of equipment, this ATM11 equips a customer with CRT12, the passbook insertion opening 13, the card slot 14, the coin-tray payment opening 15, the bill close payment opening 16, and the handling drop 17 of the touch panel combination which carries out display guidance of the dealings actuation, and permits dealings of payment, payment, transfer, passbook entry, and inquiries for the balances.

[0017] Drawing 2 shows the control circuit block diagram of ATM11, and CPU21 controls each circuit apparatus in accordance with the program stored in ROM22, and memorizes the control data possible [ read-out ] by RAM23.

[0018] Above-mentioned CPU21 has connected CRT12, the passbook processing section 25, the card processing section 26, the coin processing section 27, the bill processing section 28, the detail vote processing section 29, the journalling section 30, the center communications processing section 31, the remote supervisory equipment (CRMC) communications processing section 32, and the official-in-charge panel processing section 33 through an interface 24.

[0019] Among these, CRT12 has the touch input function which carries out touch input permission corresponding to a part for the display which displayed the operating procedure as various kinds of dealings display guidance, and was displayed on the screen.

[0020] The passbook processing section 25 reads the dealings data of the passbook inserted in the passbook insertion opening 13, and carries out write-in processing of the updating data, and is a deed about \*\*\*\* processing of dealings data and non-\*\*\*\*ed data in the print zone of a passbook. Furthermore, it dealings-ends, and cancels and a passbook is sometimes returned at the passbook insertion opening 13.

[0021] Write-in processing is carried out, it dealings-ends, and the card processing section 26 cancels [ the dealings data of the ATM card inserted in the card slot 14 are read, and ] updating data, and sometimes emits a card at a card slot 14.

[0022] The coin processing section 27 incorporates the coin thrown into the coin-tray payment opening 15 inside, receives it, processes it, carries out the payment time and payment cancellation, and sometimes emits a coin from the coin-tray payment opening 15.

[0023] The bill processing section 28 incorporates the bill thrown into the bill close payment opening 16 inside, receives it, processes it, carries out the payment time and payment cancellation, and sometimes emits a bill from the bill close payment opening 16.

[0024] The detail vote processing section 29 publishes the detail vote which indicated the

dealings data of various kinds of contents of dealings, such as close payment dealings and inquiry for the balances, for every dealings.

[0025] Whenever the journalling section 30 publishes a detail vote, it saves the journal (bracing cut-form) of these contents of record in the interior of equipment.

[0026] The center communications processing section 31 transmits close payment demand wording of a telegram, \*\*\*\* demand wording of a telegram, etc. which were edited to a center 34, and carries out reception of the automatic dealings data sent from this center 34, such as a close payment reply and \*\*\*\* data.

[0027] The remote supervisory equipment (CRMC) communications processing section 32 transmits the detection data of ATM11 to CRMC, and carries out reception of the response data answered from CRMC.

[0028] The official-in-charge panel processing section 33 deals with the official-in-charge panel with which the interior of ATM is equipped, and performs official-in-charge actuation of attachment-and-detachment actuation of a bill and a coin, distribution/scrutinization processing, failure restoration, maintenance check, etc., etc.

[0029] Drawing 3 shows the bill processor 35 by which an internal configuration is carried out to ATM11, and while this bill processor 35 is open for free passage with the bill close payment opening 16, conveyance Rhine L is minded. Temporarily The hold section 36, the employment cartridge 37, each stackers 38a-38c according to denomination, and the denomination and number of sheets by which payment assignment was carried out by making conveyance connection of the bill stripping section 39 grade -- \*\*\*\*\* from each stackers 38a-38c according to denomination -- it constitutes like.

[0030] Drawing 4 and drawing 5 show the bill delivery equipment 41 with which the receipts-and-payments actuated valve position of a bill is equipped. this bill delivery equipment 41 -- the pickup roller R1 for the initial delivery of the right and left arranged in accordance with the delivery path 42 of the bill A sent out from stacker 38a and R2 [ for example, ] The feed roller R3 on either side and R4 The gate roller R5 on either side and R6 The delivery detection sensor S1 on either side and S2 It consists of thrust adjustment devices 43 and 44 on either side and clearance adjustment devices 45 and 46 on either side.

[0031] Press energization of the bill A by which above-mentioned stacker 38a is the bill press plate 47, and the laminating was carried out is carried out from a lower part in the upper part. The pickup roller R1 divided into right and left in this upper part opposite location by which press energization was carried out, and R2 It arranges. Both the pickup rollers R1 and R2 The bill A on the top face of the maximum which press energization of the bill A by which the laminating was carried out was carried out, was caught, and was caught is these rollers R1 and R2. It is standing by by the contact corresponding state in which an one-sheet delivery is possible.

[0032] The pickup roller R1 of these right and left, and R2 A drive is faced. pulse motor M1 for pickup rollers from -- the revolving shaft 48 and both the transfer belt B1 which constructed the rotation transfer force crosswise [ delivery ], and B-2 minding -- these both rollers R1 and R2 Drive transfer is carried out. Both [ these ] the rollers R1 and R2 By carrying out a rotation drive, initial delivery actuation of the bill A on top is carried out one by one from stacker 38a.

[0033] Moreover, the pickup roller R1 of these right and left and R2 It receives, the press arms 51 and 52 are minded with the energization springs 49 and 50 on either side, and it is these both rollers R1 and R2. Press energization is placed upside down for bill contact.

[0034] the feed roller R3 of the right and left which equipped the delivery location of the delivery path 42 with the high friction members 53, such as rubber material for

performing one-sheet \*\*\*\* by one revolution to a part of peripheral surface, and R4 [ and ] one sheet which regulates rotation of the delivery direction -- taking out -- the gate roller R5 of right and left for control, and R6 it opposite-\*\* -- making -- these roller R3 - R6 [ moreover, ] the overlap form made to carry out concavo-convex correspondence for separation promotion -- carrying out -- Bill A -- every one sheet -- \*\*\*\*\* -- it is made like.

[0035] the feed roller R3 of these right and left and R4 a drive -- facing -- pulse motor M2 for feed rollers from -- the revolving shaft 54 which constructed the rotation transfer force crosswise [ delivery ] -- minding -- these both rollers R3 and R4 Drive transfer is carried out. [ moreover, ]

[0036] The clearance adjustment devices 45 and 46 of above-mentioned right and left are the gate rollers R5, when it has the right-and-left said device and explains taking the case of the clearance adjustment device 45 by the side of one. The amount of tilt of the supported tilt lever 55 which carries out tilt permission, and this tilt lever 55 is adjusted, and it is the gate roller R5. Feed roller R3 The flexible adjustment shaft 56 which adjusts the amount of overlap of a between is had and constituted.

[0037] The above-mentioned tilt lever 55 is the gate roller R5 which has a TO configuration and was mentioned already in the TO form protruding piece 57 of this pars intermedia. It pivots and is the gate roller R5 to the tilt supporting point about the upper limit pivotable support section 58 of the tilt lever 55. It is the gate roller R5 by energization operation of the energization spring 59 which carried out tilt permission, and supported, and was connected to the lower limit of the tilt lever 55. Feed roller R3 Energization support is carried out at the side.

[0038] Flexible movable is carried out with the actuator which is not illustrated, between frames 60 is connected with the tilt lever 55, attitude migration of the tilt lever 55 side is carried out on the basis of this frame 60, and the above-mentioned flexible adjustment shaft 56 is the gate roller R5. Feed roller R3 An opposite clearance is tuned finely.

[0039] Moreover, the pickup roller R1 on either side and R2 In the corresponding press arms 51 and 52 on either side, they are the distorted detection sensor S3 for pickup rollers, and S4. It attaches and is the pickup roller R1 of both sides, and R2 at the time of a bill delivery. It is change of the force in which it is added The distorted detection sensor S3 for the said pickup rollers, and S4 It detects from an output wave and delivery propriety is judged.

[0040] Similarly, it is the gate roller R5 on either side and R6. In the corresponding tilt levers 55 and 55 on either side, it is the distorted detection sensor S5 for gate rollers, and S6. It attaches and is the gate roller R5 and R6 at the time of a bill delivery. It is change of the force in which it is added The distorted detection sensor S5 for the said gate rollers, and S6 It detects from an output wave and delivery propriety is judged.

[0041] Furthermore, it is the torque detection sensor S7 to the revolving shaft 48 of a pickup roller. It attaches and is a pickup roller R1 and R2 at the time of a bill delivery. It is this torque detection sensor S7 about change of the force of joining a revolving shaft 48. It detects from an output wave and delivery propriety is judged.

[0042] Drawing 6 shows the control circuit block diagram of bill delivery equipment 41, and CPU61 controls each circuit apparatus in accordance with the program stored in ROM62, and memorizes the control data possible [ read-out ] by RAM63.

[0043] CPU21 -- the time of a bill delivery -- the Motor Driver circuits 64 and 65 -- minding -- each pulse motor M1 and M2 driving -- moreover, the time of this delivery -- each -- detection sensor S1 -S7 a detection signal -- the A/D-conversion circuits 66-72 -- minding -- detecting -- moreover, the timer T -- a pickup roller R1 and R2 Rotation drive

time amount is clocked.

[0044] detection sensor S1 -S7 [ by the way, ] mentioned already the time of detecting the delivery propriety of Bill A -- a delivery -- when unsuitable, the detection judging of the contents of abnormalities can be carried out further clearly -- as -- the distorted detection sensor S3 for pickup rollers, and S4 The distorted detection sensor S5 for gate rollers, and S6 Torque detection sensor S7 From each output wave, the contents of abnormalities are subdivided and a detection judging is carried out.

[0045] this shows the timing diagram of drawing 7 -- as -- each -- detection sensor S3 -S7 about an output wave, as compared with an ordinary wave form, when having separated from criteria tolerance, there is fear of an abnormal occurrence -- judging -- further -- each -- detection sensor S3 -S7 The abnormality class and the cause of abnormalities it becomes unusual from the description of waveform analysis or frequency analysis sending out are presumed.

[0046] For example, torque detection sensor S7 in drawing 7 To normal-output wave 71, as a broken line shows This torque detection sensor S7 An output wave to the pickup roller R1, and R2 When it detects that a delivery load is still expensive, as it is shown in drawing 8 - drawing 10 The delivery condition of the half-crease bill A of a high delivery load that two bills broke and were carried out is presumed, and it is presumed that deformation, a tear, and two-sheet \*\*\*\* occur with the delivery of the half-crease bill A at this time.

[0047] Furthermore, as shown in drawing 11 , it is a pickup roller R1 and R2. If halt timing detects a late thing, bill delivery spacing cannot fully be taken, but the 2nd sheet will be continuously sent out following the 1st sheet, and it will be presumed that it collides with the 1st sheet and the buckling distortion bill A is generated. On the contrary, as shown in drawing 12 , it is a pickup roller R1 and R2. If halt timing detects an early thing, it will be presumed that the delivery of the \*\*\*\*\* bill A which checks the delivery of a bill of the first sheet is generated.

[0048] Moreover, distorted detection sensor S5 for right gate rollers in drawing 7 To normal-output wave 72, as a broken line shows This distorted detection sensor S5 for right gate rollers It is the right gate roller R5 at the time of the early stages of a delivery from an output wave. It is presumed that the half-crease bill A will be generated if it detects that thrust becomes high rapidly. Moreover, it is this right gate roller R5 at the time of the telophase of a delivery. When it detects that thrust becomes high rapidly, as it is shown in drawing 13 , it takes out and it is presumed that Bill A is generated.

[0049] Hereafter, it is the distorted detection sensor S6 for left gate rollers in drawing 7 similarly. To normal-output wave 73, as a broken line shows This distorted detection sensor S6 for left gate rollers It is the left gate roller R6 at the time of the early stages of a delivery from an output wave. If thrust is not detected It presumes that a skew occurs in the meantime, and is this left gate roller R6 at the time of the telophase of a delivery. If superfluous thrust is detected, as shown in drawing 8 - drawing 11 , it will be presumed that the bill by the delivery condition of the half-crease bill A of a high delivery load, presumption, or the abnormalities in a clearance, the deformation and the tear between rollers itself is unusual.

[0050] Furthermore, distorted detection sensor S3 for right pickup rollers in drawing 7 It is this distorted detection sensor S3 for right pickup rollers to normal-output wave 74. If an output wave is in agreement, it will be presumed that the delivery by which suitable thrust was acted and stabilized is performed.

[0051] On the other hand, distorted detection sensor S4 for left pickup rollers in drawing 7 To normal-output wave 75, as a broken line shows, it is this distorted detection sensor

S4 for left pickup rollers. It is the left pickup roller R2 at the time of the telophase of a delivery from an output wave. If superfluous thrust is detected, as shown in drawing 13, it will take out and it will be presumed that Bill A is generated. Moreover, if a shimmy is detected at the time of the telophase of a delivery, the frictional force fall of a pickup roller is presumed, and cleaning of a roller will judge with the need or a roller exchange stage, and will carry out output guidance of that at an official in charge.

[0052] Thus, it is at the delivery time of a bill and the abnormalities in a delivery of a bill are detected, and those contents of abnormalities are specified at the same time CPU61 detects the abnormalities in a delivery for the configuration which can moreover subdivide and specify the contents of abnormalities, and the delivery stabilized by being at the delivery time and starting can be made to perform restoration actuation corresponding to these specified contents of abnormalities.

[0053] When the location detected as are at the abnormality detection time in a delivery, stop delivery actuation, carry out restoration processing according to the pathomorphism and this restoration actuation has abnormalities in the bill itself is the bill close payment opening 16, return actuation is carried out to a customer as it is, in stacker 38a, it displays [ generating-] or processes [ rejection-] in a jam, and the abnormal occurrence accompanying the abnormalities of the bill itself is prevented beforehand.

[0054] Moreover, as contents of restoration at the time of detecting a nonprocess runout and \*\*\*\*\* from change of the thrust of a gate roller and a pickup roller, when it is detected as abnormalities being in bill delivery equipment 41 the very thing (for example, when a skew and the abnormalities between tags are detected from change of the thrust of a gate roller), it is 1, the gate roller R5, and R6. A feed roller R3 and R4 The flexible adjustment shaft 56 adjusts an opposite clearance.

2, a pickup roller R1, and R2 Thrust is adjusted.

3, a pickup roller R1, and R2 It cleans or exchanges.

[0055] Furthermore, a pickup roller R1 and R2 A pickup roller R1 and R2 when the near abnormalities in torque are detected When the abnormalities of thrust are detected, it is a pickup roller R1 and R2. Halt timing is amended.

[0056] It judges with the delivery force of the 1st sheet being insufficient for drawing 14 in the nonprocess-runout detection field 142 which showed the relation between bill delivery spacing of the example of restoration actuation, and pickup roller thrust, and was detected except normal field 141. Moreover, as it takes out and the detection field 143 shows to drawing 15, it judges with the restraining force over the 2nd bill A in low thrust declining. on the contrary, high thrust -- as it takes out and the detection field 144 shows to drawing 16, it judges with the delivery force of Bill A being set up highly. Thus, the cause of an abnormal occurrence is solved and optimal restoration actuation according to delivery conditions at present is performed based on this elucidation.

[0057] Moreover, since the exact delivery detection information over that bill is acquired whenever it carries out delivery initiation of the bill, delivery \*\*\*\*\* is made, being able to adjust to the class of bill, and the optimal delivery conditions for every bill which changes with circulation degrees, consequently making self-correction during employment.

[0058] Thus, processing actuation of the constituted bill delivery equipment 41 is explained with reference to the flow chart of drawing 17. When the delivery signal of a bill is inputted now, CPU61 sets Timer T, after carrying out the detection check of whether it is set to the feed roller R3 and the initial valve position to which R4 were suitable for taking out one sheet (step n1), and is a pickup roller R1 and R2. A rotation halt is carried out with the rotation suitable for the one-sheet appearance of Bill A (step

n2 -n4).

[0059] Moreover, at this time, CPU61 precedes the delivery of Bill A and is the distorted detection sensor S3 for pickup rollers on either side, and S4. The pickup roller R1 on either side and R2 Press detection is started. Similarly it is the torque detection sensor S7. A pickup roller R1 and torque detection of R2 are started, and it is the distorted detection sensor S5 for gate rollers, and S6 further. The gate roller R5 and R6 Press detection is started (step n5 -n7).

[0060] these detection sensor S3 -S7 from -- if it checks that there are no abnormalities in the bill A itself, and there are no abnormalities in bill delivery equipment 41, CPU61 judges with a proper delivery being performed, and permits the delivery of Bill A (step n8 -n9).

[0061] on the other hand, the case where it is detected as abnormalities being in the bill A itself -- a pickup roller R1 and R2 And a feed roller R3 and R4 inverse rotation is carried out -- making -- feed rollers R3 and R4 from -- a delivery termination is immediately carried out before a delivery (step n10).

[0062] Moreover, when it is detected as abnormalities being in bill delivery equipment 41 the very thing, it is a pickup roller R1 and R2 immediately. Rotation is suspended, a delivery termination is carried out and restoration processing of this bill delivery equipment 41 very thing is started (steps n11-n12).

[0063] Next, torque detection sensor S7 The processing actuation at the time of using and detecting the delivery condition of a bill is explained with reference to the flow chart of drawing 18 . At the time of the delivery of a bill, CPU61 precedes the delivery of Bill A, and it is this torque detection sensor S7. A pickup roller R1 and R2 Torque detection data are incorporated (step n21), the noise of this incorporated torque detection data is removed, and waveform analysis is started (steps n22-n23).

[0064] This is the peaking capacity T1 of forward torque, as shown also in drawing 19 . Peaking capacity T2 of negative torque It compares with normal values and is the forward torque output time amount t1. Negative torque output time amount t2 Finally as compared with normal values, inclination deltaT of a torque output is compared with normal values (steps n24-n27).

[0065] If normal as compared with these normal values, it will judge with normal torque, and it is a pickup roller R1 and R2. It judges with delivery actuation to depend being performed proper (step n28).

[0066] On the other hand, when it is detected as those with abnormalities as compared with normal values, it is a pickup roller R1 and R2. It judges with the delivery abnormal occurrence to depend (step n29). Moreover, the abnormalities in a delivery are also detectable with not only waveform analysis but frequency analysis. This is the peaking capacity f0 and f1 which makes the power spectrum of an input wave by FFT (fast Fourier transform), and is acquired from this power spectrum as shown also in drawing 20 . If normal [ / normal values / as compared with normal values / as compared with these normal values ] in a peak frequency, it will judge with normal torque, and it is a pickup roller R1 and R2. It judges with delivery actuation to depend being performed proper (steps n30-n32).

[0067] On the other hand, when it is detected as those with abnormalities as compared with normal values, it is a pickup roller R1 and R2. It judges with the delivery abnormal occurrence to depend. It is based on this abnormality judging and CPU61 is a pickup roller R1 and R2 immediately. Rotation is stopped, and a delivery termination is carried out, and it is a pickup roller R1 and R2. The receiving restoration processing is started (step n33).

[0068] Next, it explains with reference to the flow chart which shows the field setting processing actuation which judges the propriety of detection data to drawing 21. The rate of bill reception of the number of sheets which should process CPU61 beforehand on the occasion of a field setup first (payment reception number of sheets / injection number of sheets), It asks for the rate of reception which compares the rate of reception by the delivery engine performance of bill delivery equipment 41, and is predicted (step n41). moreover, the delivery engine performance (the circulation degree of a bill --) of bill delivery equipment 41 to a jam incidence rate (jam generating number of sheets / conveyance number of sheets) It asks for the jam incidence rate which compares the jam incidence rate produced by \*\*\*\* by the circumference environment of temperature and humidity, and the equipment error, and the degradation degree by the wear dirt of an equipment component, and is predicted (step n42). As shown in drawing 22 from these rates of reception and jam incidence rates, the range of a normal field is set up. This has the relation with which lowering the incidence rate of raising the rate of reception of a bill and a jam disagrees, and as an abnormality distinction parameter which determines the dependability of this equipment 41, since to set it as a large area is desired as long as equipment 41 allows, the normal field in this case changes the range of a normal field, and is set up so that a jam incidence rate may serve as a specification value (step n43).

[0069] If after a setup of this normal field distinguishes propriety as compared with an input value, and an input value is in a normal field, and it will judge with delivery actuation of a bill being performed proper (step n44) and it will separate from a normal field, since there is a possibility that a jam may be generated, it will stop the delivery of a bill (step n45).

[0070] Drawing 23 shows the case where a normal field cannot be set up, and the normal values of both the curves 231,232 do not overlap for the low unsuitable rate curve 231 of reception of the rate of reception, and the unsuitable high jam incidence-rate curve 232 of a jam incidence rate, but, so, this judges with the ability of CPU61 not to be continuation operated, carries out a delivery halt at this time, and tells an official in charge about that by an alarm output etc.

[0071] As mentioned above, it is at the delivery initiation time of a bill, and since the abnormalities in a delivery of a bill are detectable, it is at this delivery initiation time, and restoration actuation is performed to coincidence, it is at the delivery initiation time and the abnormalities in a delivery can be canceled. Therefore, the bill judged that is [ a delivery ] unusual is not conveyed in a latter conveyance way, but the conveyance supply of the bill can be carried out in the always proper condition, a jam generating element can be canceled, the down of a bill processor can be avoided certainly, and the reliable stable delivery is obtained.

[0072] Moreover, the cause of generating of the abnormalities in a delivery can be subdivided and specified for the detection configuration which detects the abnormality element in a delivery to a bill from the change condition of the force applied to a delivery system at the time of a bill delivery, and based on specification of this cause of an abnormal occurrence, the optimal restoration actuation according to delivery conditions at present can be chosen, and it can restore. Furthermore, when delivery \*\*\*\*\* is made and the internal configuration of such bill delivery equipment is carried out to ATM, making [ since it is obtained for every delivery initiation of a bill, adjust exact detection information to the class of bill, and the optimal delivery conditions for every bill which changes with circulation degrees, and ] self-correction during employment, it is stabilized in the delivery engine performance and dealings processing of a reliable bill can do.

[0073] In the configuration of this invention, and correspondence with one above-

mentioned example the paper leaf delivery equipment of this invention It corresponds to the bill delivery equipment 41 of an example. Like the following a dealings processor It corresponds to ATM11 and paper leaf corresponds to Bill A. A delivery means The pickup roller R1 on either side and R2 The feed roller R3 on either side and R4 The gate roller R5 on either side and R6 It corresponds to a delivery system. A welding-pressure detection means the distorted detection sensor S3 for pickup rollers, and S4 The distorted detection sensor S5 for gate rollers, and S6 Torque detection sensor S7 It corresponds and the abnormality detection means in a delivery, a fragmentation distinction means, and a control means are not limited only to the configuration of the one example above-mentioned [ \*\* corresponding to CPU61, and this invention ]. For example, torque detection sensor S7 It replaces with and is a pulse motor M1. Torque data can also be obtained from a motor current value.

## TECHNICAL FIELD

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[Industrial Application] This invention relates to the paper leaf delivery equipment and the dealings processor which are rich in the delivery management engine performance of paper leaf in more detail about the delivery equipment of paper leaf by which an internal configuration is carried out to the automatic dealings machine which deals with paper leaf, such as a bill.

## PRIOR ART

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[Description of the Prior Art] Generally, this kind of paper leaf delivery equipment is carrying out delivery actuation of the paper leaf, carrying out the detection check of every one delivery condition of the paper leaf by which delivery starting was carried out. this time -- a skew -- shortly after taking out and accepting abnormalities in delivery, such as bias to a nonprocess runout, poor conveyance spacing, poor size, and the cross direction, it processes [ rejection-] or processes [ return-] By this, the bad influence to the latter part was avoided, accumulation actuation of paper leaf, symmetry actuation, conveyance actuation, and front flesh-side reversal actuation were made smooth, and generating of the jam (paper jam) accompanying abnormality paper leaf generating is prevented (for example, refer to Japanese Patent Application No. No. 313714 [ two to ] of precedence application).

[0003] However, such a detection means has been arranged in the latter part of delivery equipment, and carried out the detection check of the delivery back of paper leaf, the abnormality paper leaf moreover sent out was conveyed for a long time to the return processing location as it was, and a jam incidence rate, such as receiving symmetry processing and accumulation processing in this conveyance process, was high. Moreover, in the paper leaf of the 2nd sheet continuously sent out to a degree, in response to the bad influence, the jam incidence rate was high similarly.

[0004] Furthermore, although it was made to perform fixed time amount delivery actuation at the time of nonprocess-runout generating of paper leaf, since fixed time amount delivery actuation was carried out while the cause of abnormalities had been unknown, induction of the jam might be carried out on the contrary, and damage on paper leaf and the life of equipment might be shortened.

## EFFECT OF THE INVENTION

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[Effect of the Invention] Consequently, it is at the delivery initiation time of paper leaf, and since the abnormalities in a delivery of paper leaf are detectable, it is at this delivery initiation time, and restoration actuation is performed, it is at the delivery initiation time and the abnormality element in a delivery can be canceled. Therefore, the conveyance supply of all the paper leaf can be carried out in the proper condition on a latter conveyance way, a jam generating element can be canceled, the down of a paper leaf processor can be avoided, and the reliable stable delivery is obtained.

[0015] Moreover, the cause of generating of the abnormalities in a delivery can be subdivided and specified for the detection configuration which detects the abnormality element in a delivery to paper leaf from the change condition of the force applied to a delivery means at the time of a paper leaf delivery, and based on specification of this cause of an abnormal occurrence, the optimal restoration actuation according to delivery conditions at present can be chosen, and it can restore. Since such exact detection information is acquired for every delivery, delivery \*\*\*\*\* is made, adjusting to the class of paper leaf, and the optimal delivery conditions for every paper leaf which changes with circulation degrees, and making self-correction during employment. Furthermore, when the internal configuration of the paper leaf delivery equipment is carried out to a dealings processor, the delivery engine performance is stabilized and dealings processing of reliable paper leaf can be performed.

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Then, this invention aims at offer of the paper leaf delivery equipment which has the high delivery engine performance it was made to resume conveyance since a delivery halt is carried out immediately and restoration actuation was carried out when the abnormality element in a delivery is detected at the time of the delivery of paper leaf, and a dealings processor.

[0006]

## MEANS

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[Means for Solving the Problem] Invention according to claim 1 is paper leaf delivery equipment equipped with the delivery means which carries out delivery actuation of the paper leaf, and it carries out having had a welding-pressure detection means to detect change of the force of joining the above-mentioned delivery means, and an abnormality detection means in a delivery to detect the abnormalities in a delivery of paper leaf based on the welding pressure which this welding-pressure detection means detected as the description.

[0007] Invention according to claim 2 is characterized by equipping the abnormality detection means in a delivery with a fragmentation distinction means to subdivide and distinguish the abnormalities in a delivery of the detected paper leaf.

[0008] Invention according to claim 3 is characterized by having the control means which carries out restoration actuation of the abnormalities in a delivery of paper leaf according to the contents of distinction which the fragmentation distinction means distinguished.

[0009] Invention according to claim 4 is characterized by being the dealings processor which is equipped with paper leaf delivery equipment and carries out dealings processing.

## OPERATION

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[Function] According to this invention, a welding-pressure detection means detects change of the force in which a delivery means joins this delivery means in paper leaf at the time of \*\*\*\*\*, and the abnormality detection means in a delivery detects the abnormalities in a delivery of paper leaf based on that welding pressure.

[0011] Moreover, when the abnormality detection means in a delivery detects the abnormalities in a delivery of paper leaf, a fragmentation distinction means subdivides and distinguishes the abnormalities in a delivery of this detected paper leaf.

[0012] Furthermore, according to the contents of distinction which the fragmentation distinction means distinguished, a control means carries out restoration actuation of the abnormalities in a delivery of paper leaf.

[0013] Dealings processing of the paper leaf is carried out with the dealings processor equipped with such paper leaf delivery equipment.

## EXAMPLE

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[Example] One example of this invention is explained in full detail based on a drawing below. Drawing 1 shows ATM (ATM) 11 installed in financial institutions, such as a bank, and in the front face of the upper part of the body of equipment, this ATM11 equips a customer with CRT12, the passbook insertion opening 13, the card slot 14, the coin-tray payment opening 15, the bill close payment opening 16, and the handling drop 17 of the touch panel combination which carries out display guidance of the dealings actuation, and permits dealings of payment, payment, transfer, passbook entry, and inquiries for the balances.

[0017] Drawing 2 shows the control circuit block diagram of ATM11, and CPU21 controls each circuit apparatus in accordance with the program stored in ROM22, and memorizes the control data possible [ read-out ] by RAM23.

[0018] Above-mentioned CPU21 has connected CRT12, the passbook processing section 25, the card processing section 26, the coin processing section 27, the bill processing section 28, the detail vote processing section 29, the journalling section 30, the center communications processing section 31, the remote supervisory equipment (CRMC) communications processing section 32, and the official-in-charge panel processing section 33 through an interface 24.

[0019] Among these, CRT12 has the touch input function which carries out touch input permission corresponding to a part for the display which displayed the operating procedure as various kinds of dealings display guidance, and was displayed on the screen.

[0020] The passbook processing section 25 reads the dealings data of the passbook inserted in the passbook insertion opening 13, and carries out write-in processing of the updating data, and is a deed about \*\*\*\* processing of dealings data and non-\*\*\*\*ed data in the print zone of a passbook. Furthermore, it dealings-ends, and cancels and a passbook is sometimes returned at the passbook insertion opening 13.

[0021] Write-in processing is carried out, it dealings-ends, and the card processing section 26 cancels [ the dealings data of the ATM card inserted in the card slot 14 are read, and ] updating data, and sometimes emits a card at a card slot 14.

[0022] The coin processing section 27 incorporates the coin thrown into the coin-tray payment opening 15 inside, receives it, processes it, carries out the payment time and payment cancellation, and sometimes emits a coin from the coin-tray payment opening

15.

[0023] The bill processing section 28 incorporates the bill thrown into the bill close payment opening 16 inside, receives it, processes it, carries out the payment time and payment cancellation, and sometimes emits a bill from the bill close payment opening 16. [0024] The detail vote processing section 29 publishes the detail vote which indicated the dealings data of various kinds of contents of dealings, such as close payment dealings and inquiry for the balances, for every dealings.

[0025] Whenever the journalling section 30 publishes a detail vote, it saves the journal (bracing cut-form) of these contents of record in the interior of equipment.

[0026] The center communications processing section 31 transmits close payment demand wording of a telegram, \*\*\*\* demand wording of a telegram, etc. which were edited to a center 34, and carries out reception of the automatic dealings data sent from this center 34, such as a close payment reply and \*\*\*\* data.

[0027] The remote supervisory equipment (CRMC) communications processing section 32 transmits the detection data of ATM11 to CRMC, and carries out reception of the response data answered from CRMC.

[0028] The official-in-charge panel processing section 33 deals with the official-in-charge panel with which the interior of ATM is equipped, and performs official-in-charge actuation of attachment-and-detachment actuation of a bill and a coin, distribution/scrutinization processing, failure restoration, maintenance check, etc., etc.

[0029] Drawing 3 shows the bill processor 35 by which an internal configuration is carried out to ATM11, and while this bill processor 35 is open for free passage with the bill close payment opening 16, conveyance Rhine L is minded. Temporarily The hold section 36, the employment cartridge 37, each stackers 38a-38c according to denomination, and the denomination and number of sheets by which payment assignment was carried out by making conveyance connection of the bill stripping section 39 grade -- \*\*\*\*\* from each stackers 38a-38c according to denomination -- it constitutes like.

[0030] Drawing 4 and drawing 5 show the bill delivery equipment 41 with which the receipts-and-payments actuated valve position of a bill is equipped. this bill delivery equipment 41 -- the pickup roller R1 for the initial delivery of the right and left arranged in accordance with the delivery path 42 of the bill A sent out from stacker 38a and R2 [ for example, ] The feed roller R3 on either side and R4 The gate roller R5 on either side and R6 The delivery detection sensor S1 on either side and S2 It consists of thrust adjustment devices 43 and 44 on either side and clearance adjustment devices 45 and 46 on either side.

[0031] Press energization of the bill A by which above-mentioned stacker 38a is the bill press plate 47, and the laminating was carried out is carried out from a lower part in the upper part. The pickup roller R1 divided into right and left in this upper part opposite location by which press energization was carried out, and R2 It arranges. Both the pickup rollers R1 and R2 The bill A on the top face of the maximum which press energization of the bill A by which the laminating was carried out was carried out, was caught, and was caught is these rollers R1 and R2. It is standing by by the contact corresponding state in which an one-sheet delivery is possible.

[0032] The pickup roller R1 of these right and left, and R2 A drive is faced. pulse motor M1 for pickup rollers from -- the revolving shaft 48 and both the transfer belt B1 which constructed the rotation transfer force crosswise [ delivery ], and B-2 minding -- these both rollers R1 and R2 Drive transfer is carried out. Both [ these ] the rollers R1 and R2 By carrying out a rotation drive, initial delivery actuation of the bill A on top is carried out one by one from stacker 38a.

[0033] Moreover, the pickup roller R1 of these right and left and R2 It receives, the press arms 51 and 52 are minded with the energization springs 49 and 50 on either side, and it is these both rollers R1 and R2. Press energization is placed upside down for bill contact. [0034] the feed roller R3 of the right and left which equipped the delivery location of the delivery path 42 with the high friction members 53, such as rubber material for performing one-sheet \*\*\*\* by one revolution to a part of peripheral surface, and R4 [ and ] one sheet which regulates rotation of the delivery direction -- taking out -- the gate roller R5 of right and left for control, and R6 it opposite-\*\* -- making -- these roller R3 - R6 [ moreover, ] the overlap form made to carry out concavo-convex correspondence for separation promotion -- carrying out -- Bill A -- every one sheet -- \*\*\*\*\* -- it is made like.

[0035] the feed roller R3 of these right and left and R4 a drive -- facing -- pulse motor M2 for feed rollers from -- the revolving shaft 54 which constructed the rotation transfer force crosswise [ delivery ] -- minding -- these both rollers R3 and R4 Drive transfer is carried out. [ moreover, ]

[0036] The clearance adjustment devices 45 and 46 of above-mentioned right and left are the gate rollers R5, when it has the right-and-left said device and explains taking the case of the clearance adjustment device 45 by the side of one. The amount of tilt of the supported tilt lever 55 which carries out tilt permission, and this tilt lever 55 is adjusted, and it is the gate roller R5. Feed roller R3 The flexible adjustment shaft 56 which adjusts the amount of overlap of a between is had and constituted.

[0037] The above-mentioned tilt lever 55 is the gate roller R5 which has a TO configuration and was mentioned already in the TO form protruding piece 57 of this pars intermedia. It pivots and is the gate roller R5 to the tilt supporting point about the upper limit pivotable support section 58 of the tilt lever 55. It is the gate roller R5 by energization operation of the energization spring 59 which carried out tilt permission, and supported, and was connected to the lower limit of the tilt lever 55. Feed roller R3 Energization support is carried out at the side.

[0038] Flexible movable is carried out with the actuator which is not illustrated, between frames 60 is connected with the tilt lever 55, attitude migration of the tilt lever 55 side is carried out on the basis of this frame 60, and the above-mentioned flexible adjustment shaft 56 is the gate roller R5. Feed roller R3 An opposite clearance is tuned finely.

[0039] Moreover, the pickup roller R1 on either side and R2 In the corresponding press arms 51 and 52 on either side, they are the distorted detection sensor S3 for pickup rollers, and S4. It attaches and is the pickup roller R1 of both sides, and R2 at the time of a bill delivery. It is change of the force in which it is added The distorted detection sensor S3 for the said pickup rollers, and S4 It detects from an output wave and delivery propriety is judged.

[0040] Similarly, it is the gate roller R5 on either side and R6. In the corresponding tilt levers 55 and 55 on either side, it is the distorted detection sensor S5 for gate rollers, and S6. It attaches and is the gate roller R5 and R6 at the time of a bill delivery. It is change of the force in which it is added The distorted detection sensor S5 for the said gate rollers, and S6 It detects from an output wave and delivery propriety is judged.

[0041] Furthermore, it is the torque detection sensor S7 to the revolving shaft 48 of a pickup roller. It attaches and is a pickup roller R1 and R2 at the time of a bill delivery. It is this torque detection sensor S7 about change of the force of joining a revolving shaft 48. It detects from an output wave and delivery propriety is judged.

[0042] Drawing 6 shows the control circuit block diagram of bill delivery equipment 41, and CPU61 controls each circuit apparatus in accordance with the program stored in

ROM62, and memorizes the control data possible [ read-out ] by RAM63.

[0043] CPU21 -- the time of a bill delivery -- the Motor Driver circuits 64 and 65 -- minding -- each pulse motor M1 and M2 driving -- moreover, the time of this delivery -- each -- detection sensor S1 -S7 a detection signal -- the A/D-conversion circuits 66-72 -- minding -- detecting -- moreover, the timer T -- a pickup roller R1 and R2 Rotation drive time amount is clocked.

[0044] detection sensor S1 -S7 [ by the way, ] mentioned already the time of detecting the delivery propriety of Bill A -- a delivery -- when unsuitable, the detection judging of the contents of abnormalities can be carried out further clearly -- as -- the distorted detection sensor S3 for pickup rollers, and S4 The distorted detection sensor S5 for gate rollers, and S6 Torque detection sensor S7 From each output wave, the contents of abnormalities are subdivided and a detection judging is carried out.

[0045] this shows the timing diagram of drawing 7 -- as -- each -- detection sensor S3 -S7 about an output wave, as compared with an ordinary wave form, when having separated from criteria tolerance, there is fear of an abnormal occurrence -- judging -- further -- each -- detection sensor S3 -S7 The abnormality class and the cause of abnormalities it becomes unusual from the description of waveform analysis or frequency analysis sending out are presumed.

[0046] For example, torque detection sensor S7 in drawing 7 To normal-output wave 71, as a broken line shows This torque detection sensor S7 An output wave to the pickup roller R1, and R2 When it detects that a delivery load is still expensive, as it is shown in drawing 8 - drawing 10 The delivery condition of the half-crease bill A of a high delivery load that two bills broke and were carried out is presumed, and it is presumed that deformation, a tear, and two-sheet \*\*\*\* occur with the delivery of the half-crease bill A at this time.

[0047] Furthermore, as shown in drawing 11 , it is a pickup roller R1 and R2. If halt timing detects a late thing, bill delivery spacing cannot fully be taken, but the 2nd sheet will be continuously sent out following the 1st sheet, and it will be presumed that it collides with the 1st sheet and the buckling distortion bill A is generated. On the contrary, as shown in drawing 12 , it is a pickup roller R1 and R2. If halt timing detects an early thing, it will be presumed that the delivery of the \*\*\*\*\* bill A which checks the delivery of a bill of the first sheet is generated.

[0048] Moreover, distorted detection sensor S5 for right gate rollers in drawing 7 To normal-output wave 72, as a broken line shows This distorted detection sensor S5 for right gate rollers It is the right gate roller R5 at the time of the early stages of a delivery from an output wave. It is presumed that the half-crease bill A will be generated if it detects that thrust becomes high rapidly. Moreover, it is this right gate roller R5 at the time of the telophase of a delivery. When it detects that thrust becomes high rapidly, as it is shown in drawing 13 , it takes out and it is presumed that Bill A is generated.

[0049] Hereafter, it is the distorted detection sensor S6 for left gate rollers in drawing 7 similarly. To normal-output wave 73, as a broken line shows This distorted detection sensor S6 for left gate rollers It is the left gate roller R6 at the time of the early stages of a delivery from an output wave. If thrust is not detected It presumes that a skew occurs in the meantime, and is this left gate roller R6 at the time of the telophase of a delivery. If superfluous thrust is detected, as shown in drawing 8 - drawing 11 , it will be presumed that the bill by the delivery condition of the half-crease bill A of a high delivery load, presumption, or the abnormalities in a clearance, the deformation and the tear between rollers itself is unusual.

[0050] Furthermore, distorted detection sensor S3 for right pickup rollers in drawing 7 It

is this distorted detection sensor S3 for right pickup rollers to normal-output wave 74. If an output wave is in agreement, it will be presumed that the delivery by which suitable thrust was acted and stabilized is performed.

[0051] On the other hand, distorted detection sensor S4 for left pickup rollers in drawing 7 To normal-output wave 75, as a broken line shows, it is this distorted detection sensor S4 for left pickup rollers. It is the left pickup roller R2 at the time of the telophase of a delivery from an output wave. If superfluous thrust is detected, as shown in drawing 13, it will take out and it will be presumed that Bill A is generated. Moreover, if a shimmy is detected at the time of the telophase of a delivery, the frictional force fall of a pickup roller is presumed, and cleaning of a roller will judge with the need or a roller exchange stage, and will carry out output guidance of that at an official in charge.

[0052] Thus, it is at the delivery time of a bill and the abnormalities in a delivery of a bill are detected, and those contents of abnormalities are specified at the same time CPU61 detects the abnormalities in a delivery for the configuration which can moreover subdivide and specify the contents of abnormalities, and the delivery stabilized by being at the delivery time and starting can be made to perform restoration actuation corresponding to these specified contents of abnormalities.

[0053] When the location detected as are at the abnormality detection time in a delivery, stop delivery actuation, carry out restoration processing according to the pathomorphism and this restoration actuation has abnormalities in the bill itself is the bill close payment opening 16, return actuation is carried out to a customer as it is, in stacker 38a, it displays [ generating-] or processes [ rejection-] in a jam, and the abnormal occurrence accompanying the abnormalities of the bill itself is prevented beforehand.

[0054] Moreover, as contents of restoration at the time of detecting a nonprocess runout and \*\*\*\*\* from change of the thrust of a gate roller and a pickup roller, when it is detected as abnormalities being in bill delivery equipment 41 the very thing (for example, when a skew and the abnormalities between tags are detected from change of the thrust of a gate roller), it is 1, the gate roller R5, and R6. A feed roller R3 and R4 The flexible adjustment shaft 56 adjusts an opposite clearance.

2, a pickup roller R1, and R2 Thrust is adjusted.

3, a pickup roller R1, and R2 It cleans or exchanges.

[0055] Furthermore, a pickup roller R1 and R2 A pickup roller R1 and R2 when the near abnormalities in torque are detected When the abnormalities of thrust are detected, it is a pickup roller R1 and R2. Halt timing is amended.

[0056] It judges with the delivery force of the 1st sheet being insufficient for drawing 14 in the nonprocess-runout detection field 142 which showed the relation between bill delivery spacing of the example of restoration actuation, and pickup roller thrust, and was detected except normal field 141. Moreover, as it takes out and the detection field 143 shows to drawing 15 , it judges with the restraining force over the 2nd bill A in low thrust declining. on the contrary, high thrust -- as it takes out and the detection field 144 shows to drawing 16 , it judges with the delivery force of Bill A being set up highly. Thus, the cause of an abnormal occurrence is solved and optimal restoration actuation according to delivery conditions at present is performed based on this elucidation.

[0057] Moreover, since the exact delivery detection information over that bill is acquired whenever it carries out delivery initiation of the bill, delivery \*\*\*\*\* is made, being able to adjust to the class of bill, and the optimal delivery conditions for every bill which changes with circulation degrees, consequently making self-correction during employment.

[0058] Thus, processing actuation of the constituted bill delivery equipment 41 is

explained with reference to the flow chart of drawing 17 . When the delivery signal of a bill is inputted now, CPU61 sets Timer T, after carrying out the detection check of whether it is set to the feed roller R3 and the initial valve position to which R4 were suitable for taking out one sheet (step n1), and is a pickup roller R1 and R2. A rotation halt is carried out with the rotation suitable for the one-sheet appearance of Bill A (step n2 -n4).

[0059] Moreover, at this time, CPU61 precedes the delivery of Bill A and is the distorted detection sensor S3 for pickup rollers on either side, and S4. The pickup roller R1 on either side and R2 Press detection is started. Similarly it is the torque detection sensor S7. A pickup roller R1 and torque detection of R2 are started, and it is the distorted detection sensor S5 for gate rollers, and S6 further. The gate roller R5 and R6 Press detection is started (step n5 -n7).

[0060] these detection sensor S3 -S7 from -- if it checks that there are no abnormalities in the bill A itself, and there are no abnormalities in bill delivery equipment 41, CPU61 judges with a proper delivery being performed, and permits the delivery of Bill A (step n8 -n9).

[0061] on the other hand, the case where it is detected as abnormalities being in the bill A itself -- a pickup roller R1 and R2 And a feed roller R3 and R4 inverse rotation is carried out -- making -- feed rollers R3 and R4 from -- a delivery termination is immediately carried out before a delivery (step n10).

[0062] Moreover, when it is detected as abnormalities being in bill delivery equipment 41 the very thing, it is a pickup roller R1 and R2 immediately. Rotation is suspended, a delivery termination is carried out and restoration processing of this bill delivery equipment 41 very thing is started (steps n11-n12).

[0063] Next, torque detection sensor S7 The processing actuation at the time of using and detecting the delivery condition of a bill is explained with reference to the flow chart of drawing 18 . At the time of the delivery of a bill, CPU61 precedes the delivery of Bill A, and it is this torque detection sensor S7. A pickup roller R1 and R2 Torque detection data are incorporated (step n21), the noise of this incorporated torque detection data is removed, and waveform analysis is started (steps n22-n23).

[0064] This is the peaking capacity T1 of forward torque, as shown also in drawing 19 . Peaking capacity T2 of negative torque It compares with normal values and is the forward torque output time amount t1. Negative torque output time amount t2 Finally as compared with normal values, inclination deltaT of a torque output is compared with normal values (steps n24-n27).

[0065] If normal as compared with these normal values, it will judge with normal torque, and it is a pickup roller R1 and R2. It judges with delivery actuation to depend being performed proper (step n28).

[0066] On the other hand, when it is detected as those with abnormalities as compared with normal values, it is a pickup roller R1 and R2. It judges with the delivery abnormal occurrence to depend (step n29). Moreover, the abnormalities in a delivery are also detectable with not only waveform analysis but frequency analysis. This is the peaking capacity f0 and f1 which makes the power spectrum of an input wave by FFT (fast Fourier transform), and is acquired from this power spectrum as shown also in drawing 20 . If normal [ / normal values / as compared with normal values / as compared with these normal values ] in a peak frequency, it will judge with normal torque, and it is a pickup roller R1 and R2. It judges with delivery actuation to depend being performed proper (steps n30-n32).

[0067] On the other hand, when it is detected as those with abnormalities as compared

with normal values, it is a pickup roller R1 and R2. It judges with the delivery abnormal occurrence to depend. It is based on this abnormality judging and CPU61 is a pickup roller R1 and R2 immediately. Rotation is stopped, and a delivery termination is carried out, and it is a pickup roller R1 and R2. The receiving restoration processing is started (step n33).

[0068] Next, it explains with reference to the flow chart which shows the field setting processing actuation which judges the propriety of detection data to drawing 21. The rate of bill reception of the number of sheets which should process CPU61 beforehand on the occasion of a field setup first (payment reception number of sheets / injection number of sheets), It asks for the rate of reception which compares the rate of reception by the delivery engine performance of bill delivery equipment 41, and is predicted (step n41). moreover, the delivery engine performance (the circulation degree of a bill --) of bill delivery equipment 41 to a jam incidence rate (jam generating number of sheets / conveyance number of sheets) It asks for the jam incidence rate which compares the jam incidence rate produced by \*\*\*\* by the circumference environment of temperature and humidity, and the equipment error, and the degradation degree by the wear dirt of an equipment component, and is predicted (step n42). As shown in drawing 22 from these rates of reception and jam incidence rates, the range of a normal field is set up. This has the relation with which lowering the incidence rate of raising the rate of reception of a bill and a jam disagrees, and as an abnormality distinction parameter which determines the dependability of this equipment 41, since to set it as a large area is desired as long as equipment 41 allows, the normal field in this case changes the range of a normal field, and is set up so that a jam incidence rate may serve as a specification value (step n43).

[0069] If after a setup of this normal field distinguishes propriety as compared with an input value, and an input value is in a normal field, and it will judge with delivery actuation of a bill being performed proper (step n44) and it will separate from a normal field, since there is a possibility that a jam may be generated, it will stop the delivery of a bill (step n45).

[0070] Drawing 23 shows the case where a normal field cannot be set up, and the normal values of both the curves 231,232 do not overlap for the low unsuitable rate curve 231 of reception of the rate of reception, and the unsuitable high jam incidence-rate curve 232 of a jam incidence rate, but, so, this judges with the ability of CPU61 not to be continuation operated, carries out a delivery halt at this time, and tells an official in charge about that by an alarm output etc.

[0071] As mentioned above, it is at the delivery initiation time of a bill, and since the abnormalities in a delivery of a bill are detectable, it is at this delivery initiation time, and restoration actuation is performed to coincidence, it is at the delivery initiation time and the abnormalities in a delivery can be canceled. Therefore, the bill judged that is [ a delivery ] unusual is not conveyed in a latter conveyance way, but the conveyance supply of the bill can be carried out in the always proper condition, a jam generating element can be canceled, the down of a bill processor can be avoided certainly, and the reliable stable delivery is obtained.

[0072] Moreover, the cause of generating of the abnormalities in a delivery can be subdivided and specified for the detection configuration which detects the abnormality element in a delivery to a bill from the change condition of the force applied to a delivery system at the time of a bill delivery, and based on specification of this cause of an abnormal occurrence, the optimal restoration actuation according to delivery conditions at present can be chosen, and it can restore. Furthermore, when delivery \*\*\*\*\* is made and the internal configuration of such bill delivery equipment is carried out to ATM,

making [ since it is obtained for every delivery initiation of a bill, adjust exact detection information to the class of bill, and the optimal delivery conditions for every bill which changes with circulation degrees, and ] self-correction during employment, it is stabilized in the delivery engine performance and dealings processing of a reliable bill can do.

[0073] In the configuration of this invention, and correspondence with one above-mentioned example the paper leaf delivery equipment of this invention It corresponds to the bill delivery equipment 41 of an example. Like the following a dealings processor It corresponds to ATM11 and paper leaf corresponds to Bill A. A delivery means The pickup roller R1 on either side and R2 The feed roller R3 on either side and R4 The gate roller R5 on either side and R6 It corresponds to a delivery system. A welding-pressure detection means the distorted detection sensor S3 for pickup rollers, and S4 The distorted detection sensor S5 for gate rollers, and S6 Torque detection sensor S7 It corresponds and the abnormality detection means in a delivery, a fragmentation distinction means, and a control means are not limited only to the configuration of the one example above-mentioned [ \*\* corresponding to CPU61, and this invention ]. For example, torque detection sensor S7 It replaces with and is a pulse motor M1. Torque data can also be obtained from a motor current value.

## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The appearance perspective view of ATM of this invention.

[Drawing 2] The control circuit block diagram of ATM of this invention.

[Drawing 3] The internal configuration Fig. of the bill processor of this invention.

[Drawing 4] The important section side elevation showing the bill delivery equipment of this invention.

[Drawing 5] The top view showing the bill delivery equipment of this invention.

[Drawing 6] The control circuit block diagram of the bill delivery equipment of this invention.

[Drawing 7] The timing diagram which shows the output wave of the bill delivery equipment of this invention.

[Drawing 8] The explanatory view showing the delivery condition of the half-crease bill of this invention.

[Drawing 9] The explanatory view showing the deformation delivery condition of the half-crease bill of this invention.

[Drawing 10] The explanatory view which the half-crease bill of this invention attracts and in which taking out two sheets and showing a condition.

[Drawing 11] The explanatory view showing the generating condition of the buckling bill of this invention.

[Drawing 12] The explanatory view showing the generating condition of the \*\*\*\*\* bill of this invention.

[Drawing 13] The explanatory view in which this invention taking out for and showing the generating condition of a bill.

[Drawing 14] The graph showing the relation between bill delivery spacing of the bill delivery equipment of this invention, and the thrust of a pickup roller.

[Drawing 15] The explanatory view of the press lack-of-ability field of this invention in which taking out for and showing a condition.

[Drawing 16] The explanatory view of the overthrust field of this invention in which taking out for and showing a condition.

[Drawing 17] The flow chart which shows processing actuation of the bill delivery equipment of this invention.

[Drawing 18] The flow chart which shows the detection processing actuation using the torque detection sensor of this invention.

[Drawing 19] The explanatory view showing the waveform analysis using the torque detection sensor of this invention.

[Drawing 20] The explanatory view showing the frequency analysis using the torque detection sensor of this invention.

[Drawing 21] The flow chart which shows setting processing actuation of the normal field of the bill delivery equipment of this invention.

[Drawing 22] The explanatory view at the time of setting up the normal field of this invention.

[Drawing 23] The explanatory view showing the case where it becomes the abnormality delivery which cannot set up the normal field of this invention.

[Description of Notations]

11 -- ATM

16 -- Bill close payment opening

35 -- Bill processor

38a-38c -- Stacker

41 -- Bill delivery equipment

61 -- CPU

71-75 -- Normal-output <wave BR> 141 -- Normal field

A -- Paper \*\*

R1 and R2 -- Pickup roller

R3 and R4 -- Feed roller

R5 and R6 -- gate roller

M1 and M2 -- Pulse motor

S3 -S7 -- Detection sensor